ENVIRONMENTAL PROTECTION AGENCY
REVIEW AND COMMENT
TECHNICAL MEMORANDUM (TM)6 - MODEL DESCRIPTIONS
OPERABLE UNIT 2, JANUARY, 1993

2.0 GENERAL COMMENT

1. Contaminant fate and transport processes that may occur at the boundary between the alluvial fate and transport model (MT3D) and the colluvial fate and transport model (ONED3) are not included. After ground water exits the Rocky Flats alluvium through surface seeps, the contaminants may volatilize at the surface or adsorb to surface or near-surface soils before entering the colluvium. Assumptions and calculations should be included to describe contaminant fate and transport processes that occur at the alluvium/ground surface/colluvium boundary. The results will be critical to the overall contaminant fate and transport model and should be included.

Response: For the purpose of providing fate and transport modeling results to support risk assessment, it is considered unnecessary to include an evaluation of processes that occur at the alluvium/ground surface/colluvium boundary. By not removing volatilized contaminants from the flow system, the estimated groundwater concentrations within the colluvium will be conservative (i.e., they will be overestimates of volatile contaminant concentrations.)

3.0 SPECIFIC COMMENTS

1. Page 1-5, Section 1.2.2. The discussion of on-site meteorology does not include ambient temperature conditions. Temperature influences both volatilization rates of organic compounds and atmospheric stability, therefore, a discussion of temperature would be appropriate and should be included. Additionally, annual potential free-water evaporation is quantified, but its relevance to the model selection is not discussed. The purpose of including this value in the analysis should be explained.

   Rationale: For completeness and clarity, this section should discuss site temperature conditions and explain the purpose of the annual potential free-water evaporation.

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Response: Ambient temperature is important in the dispersion modeling portion of the project and will be incorporated in the FDM modeling by inputting hourly temperature from an appropriate year of meteorological data representative of on-site conditions. These data will either be obtained from the on-site meteorological database maintained by EG&G or from a database of meteorological data measured at the Jefferson County airport. Annual potential-free water evaporation is not one of the inputs required for the air quality modeling and, thus, is not relevant to air quality model selection. It is presented in Section 1.2.2 as part of the general discussion of site meteorological conditions.

2. Pages 2-1 through 2-5. The exposure scenarios for current and future off-site residents should include ground water use, such as ingestion, inhalation of vapors and dermal contact, as well as external irradiation exposure. Ingestion of homegrown fruits, including surface deposition of particulates and plant uptake of contaminants, should be included in all residential scenarios. Ingestion of homegrown vegetables should include plant uptake of chemicals in soil for all residential scenarios. These pathways should be added to those presented in this section. Modeling for surface water, ground water, and air should provide point concentrations appropriate for estimating risks from these pathways (EPA 1989).

   Rationale: Several potential exposure pathways have been omitted and should be included in this section.

Response: The exposure scenarios are currently being reviewed for approval by EPA/CDH in TM5. All pathways in that TM will be evaluated.

3. Page 3-5, Paragraph 4. This paragraph states that the computer model MT3D simulates the processes of advection, dispersion, sink and source mixing, and chemical reactions. This paragraph should also state whether the MT3D computer model will be used to model organic and metal (including radionuclide) contaminant migration. From this description, it is not clear that MT3D will be capable of modeling the movement of both organic and metal contaminants in ground water. This point should be clarified.

   Rationale: Contamination of metals and organic compounds and radionuclides may be a major component of the ground-water contamination at OU2 and should be modeled.

Response: MT3D has the capability of modeling dissolved organics, metals, and radionuclides. Representative contaminants identified as contaminants of concern from each of these groups will be modeled. The text will be modified to clarify this point.

4. Page 3-8, Paragraph 5. This paragraph discusses the selection of the computer model ONED3 for modeling contaminant fate and transport in the colluvium. This model assumes a homogeneous aquifer; however, the colluvium may be very heterogeneous. Possible heterogeneous conditions in the colluvium should be addressed.

   Rationale: The geologic conditions to which the model will be applied and should include all possible conditions.

Response: We recognize that the colluvium may be very heterogeneous; however, the heterogeneity of geologic conditions on the OU 2 hillsides is not well defined. Simplifying assumptions will be made when using ONED3 to provide a conservative estimate of contaminant discharge from these areas.

5. Pages 3-10 through 3-15, Section 3.5. The technical memorandum should include a procedure for calibrating the universal soil loss equation (USLE) model to actual field conditions. Without field calibration, the USLE model is potentially inaccurate.

   Rationale: To obtain useful results, the USLE model must be calibrated with data derived from watershed monitoring.

Response: The USLE will be used to estimate the annual sediment erosion loss. The USLE's erosivity index, R, will be used to calibrate the USLE to total suspended solids data, either on a storm event-specific or annual average basis, as appropriate.

6. Page 3-14, Section 3.5.2. This section should discuss what results are expected from the surface water model. To estimate human health risks, the upper 95th percentile concentration of the mean is required for each contaminant of concern. It is not clear whether these results can be obtained from the model described.

Rationale: The technical memorandum needs to discuss how the model will provide data that is required for the risk assessment.

Response: The output of the surface water model is anticipated to be the maximum, 30-year average concentrations occurring over a very long horizon, perhaps 1,000 years. A significant source of uncertainty in this estimate will be random hydrologic variability (i.e., runoff and associated sediment loads). It is anticipated that this uncertainty will be quantified in the form of a probability distribution for maximum, 30-year average concentrations so that statistics of interest (e.g., the upper 95 percent confidence limit on the mean can be estimated). This probability distribution will be generated by Monte Carlo simulation using randomly selected precipitation (annual average or event-specific) as the input.

7. Page 3-22, Section 3.7.2. One of the models selected for estimating pollutant concentrations is a conventional box model. Box models incorporate several assumptions that limit the useability of their results. Because of such limitations, the selection of the box model over alternative models should be justified, and assumptions and limitations of the model for this application should be addressed.

Rationale: The selection of this model should be justified.

Response: The box model was selected because of its simplicity of use and its ability to produce a worst-case estimate of air quality impacts that would not be subject to the criticism of not being conservative enough for risk assessment purposes. It is also highly appropriate for the near-source scenario examined in the TM6. The box model is the most widely used and referenced method of estimation for this type of application.